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**MODERN APPROACHES TO PREPARING STUDENTS FOR RESEARCH
ACTIVITIES USING ARTIFICIAL INTELLIGENCE: ANALYSIS AND SURVEY RESULTS BASED
ON INTERNATIONAL EXPERIENCE AND THE EXAMPLE OF CHONGQING CITY VOCATIONAL
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Artificial intelligence (AI) technologies are increasingly transforming higher education by enhancing students' preparation for research activities and expanding opportunities for scientific inquiry. This study

aims to analyze modern approaches to integrating AI into research training based on international experience and the example of Chongqing City Vocational and Technical Institute (China). The research employed a quantitative survey method using the Wenjuanxing online platform. A total of 524 students from various specialties participated in the study. The questionnaire examined students' research experience, the use of AI tools in scientific work, perceived effectiveness, and challenges associated with AI integration. The findings revealed that AI tools are widely applied for literature search, data processing, statistical analysis, and data visualization. More than 90% of respondents acknowledged the growing importance of AI in future research activities. At the same time, students reported difficulties related to insufficient research experience, limited resources, overreliance on technology, and risks of plagiarism and incorrect interpretation of results. The study demonstrates that effective AI integration requires not only technological access but also structured pedagogical support, ethical guidance, and the development of digital and research competencies. The results may contribute to improving AI-driven educational practices and research-oriented learning models in higher education institutions in Kazakhstan and other countries.

Keywords: artificial Intelligence (AI), research competencies, higher education, student training, digital literacy, Chongqing City Vocational and Technical Institute.

СТУДЕНТТЕРДІ ЖАСАНДЫ ИНТЕЛЛЕКТТІ ҚОЛДАНА ОТЫРЫП ҒЫЛЫМИ-ЗЕРТТЕУ ЖҰМЫСТАРЫНА ДАЙЫНДАУДЫҢ ЗАМАНАУИ ТӘСІЛДЕРІ: ХАЛЫҚАРАЛЫҚ ТӘЖІРИБЕ ЖӘНЕ ЧУНЦИН ҚАЛАЛЫҚ КӘСІБИ-ТЕХНИКАЛЫҚ ИНСТИТУТЫ МЫСАЛЫНДАҒЫ ТАЛДАУ ЖӘНЕ САУАЛНАМА НӘТИЖЕЛЕРІ (ҚЫТАЙ)

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Жасанды интеллект (ЖИ) технологиялары жоғары білім беру жүйесінде студенттердің ғылыми-зерттеу қызметіне дайындығын жетілдірудің маңызды құралына айналууда. Бұл зерттеудің мақсаты – халықаралық тәжірибе мен Қытайдағы Чунцин қалалық кәсіби-техникалық институтының мысалы негізінде студенттерді ғылыми-зерттеу жұмыстарына жасанды интеллект (ЖИ) арқылы даярлаудың заманауи тәсілдерін талдау. Зерттеу барысында Wenjuanxing онлайн платформасы арқылы сандық сауалнама жүргізілді. Зерттеуге әртүрлі мамандықтар бойынша білім алатын 524 студент қатысты. Сауалнама студенттердің зерттеу тәжірибесін, ғылыми қызметте жасанды интеллект (ЖИ) құралдарын қолдануын, олардың тиімділігіне деген көзқарасын және интеграция барысында кездесетін қиындықтарды анықтауға бағытталды. Нәтижелер жасанды интеллект (ЖИ) құралдарының әдебиеттерді іздеу, деректерді өңдеу, статистикалық талдау және визуализациялау үшін кеңінен қолданылатынын көрсетті. Респонденттердің 90%-дан астамы болашақ ғылыми-зерттеу қызметінде жасанды интеллект (ЖИ) рөлінің арта түсетінін атап өтті. Сонымен қатар студенттер зерттеу тәжірибесінің жеткіліксіздігі, ресурстар тапшылығы, технологияға шамадан тыс тәуелділік, плагиат қаупі және нәтижелерді қате түсіндіру сияқты мәселелерді көрсетті. Зерттеу нәтижелері ЖИ-ді тиімді енгізу үшін технологиялық қолжетімділікпен қатар педагогикалық қолдау, этикалық реттеу және цифрлық-зерттеу құзыреттерін дамыту қажеттігін дәлелдейді.

Түйінді сөздер: жасанды интеллект (ЖИ), зерттеу құзыреттіліктері, жоғары білім, студенттерді даярлау, цифрлық сауаттылық, Чунцин қаласының кәсіптік және техникалық институты.

СОВРЕМЕННЫЕ ПОДХОДЫ К ПОДГОТОВКЕ СТУДЕНТОВ К НАУЧНО-ИССЛЕДОВАТЕЛЬСКОЙ ДЕЯТЕЛЬНОСТИ С ИСПОЛЬЗОВАНИЕМ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА: АНАЛИЗ И РЕЗУЛЬТАТЫ ОПРОСА НА ОСНОВЕ МЕЖДУНАРОДНОГО ОПЫТА И ПРИМЕРА ЧУНЦИНСКОГО ГОРОДСКОГО ПРОФЕССИОНАЛЬНО-ТЕХНИЧЕСКОГО ИНСТИТУТА (КИТАЙ)

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Технологии искусственного интеллекта (ИИ) становятся важным инструментом совершенствования подготовки студентов к научно-исследовательской деятельности в системе высшего

образования. Цель данного исследования заключается в анализе современных подходов к подготовке студентов к исследовательской деятельности с использованием ИИ на основе международного опыта и примера Чунцинского городского профессионально-технического института (Китай). В исследовании использовался количественный метод с применением онлайн-платформы Wenjuanxing. В опросе приняли участие 524 студента различных специальностей. Анкета была направлена на изучение исследовательского опыта студентов, использования инструментов ИИ в научной деятельности, восприятия их эффективности, а также трудностей, связанных с интеграцией ИИ. Результаты показали, что инструменты ИИ активно применяются для поиска литературы, обработки данных, статистического анализа и визуализации результатов. Более 90% респондентов отметили возрастающую роль ИИ в будущей исследовательской деятельности. Вместе с тем студенты указали на недостаток исследовательского опыта, ограниченность ресурсов, чрезмерную зависимость от технологий, риск плагиата и неправильной интерпретации результатов. Исследование показывает, что эффективная интеграция ИИ требует не только технологической доступности, но и педагогической поддержки, этического регулирования и развития цифровых и исследовательских компетенций студентов.

Ключевые слова: искусственный интеллект (ИИ), исследовательские компетенции, высшее образование, подготовка студентов, цифровая грамотность, Чунцинский городской профессиональный и технический институт.

Introduction. Artificial intelligence (AI) technologies are increasingly becoming an integral part of modern higher education, having a significant impact on students' preparation for research activities. Unlike traditional information and communication technologies (ICTs), AI not only provides access to educational resources and digital learning environments, but also provides intelligent tools for data analysis, research modeling, and adaptive learning. This allows universities to form innovative educational ecosystems in which students develop critical thinking, creativity and research competencies necessary for full-fledged scientific work.

International analytical reports and studies prepared by UNESCO, the OECD and the World Economic Forum emphasize the increasing role of AI in shaping the future of education and science[1]. It is noted that the quality of students' preparation for research depends on several factors: the availability of digital infrastructure and AI-enabled platforms, financing of educational innovations, as well as the willingness of teachers and students to use modern pedagogical and technological tools.

A number of countries are already actively implementing reforms in higher education, strengthening the use of AI in education and science. In Kazakhstan, for example, government strategies are focused on training highly qualified personnel, integrating AI into the educational process, and creating a unified digital platform for scientific and administrative activities [2]. Similar approaches are being implemented in China, where universities and professional colleges are implementing AI to modernize curricula and improve student research training.

The article also analyzes international experience and presents a practical example of Chongqing City Vocational and Technical Institute (China), where artificial intelligence is used as a tool to increase students' readiness for scientific activity.

A significant amount of research is devoted to the introduction of artificial intelligence (AI) technologies in the field of higher education, especially in the context of preparing students for research activities. So, Zawacki-Richter et al. presented a systematic review of the use of AI in universities, highlighting its role in automating academic support and developing personalized research training [3]. Wang, Sun and Chen studied adaptive AI-based learning models, showing that they significantly enhance students' ability to develop critical thinking and problem-solving skills necessary for scientific work [4].

Other studies focus on specific AI tools that support the research preparation process. For example, Holmes et al. have shown how intelligent learning systems and natural language processing technologies help students work with literature and interpret data. It is also noted that the integration of AI into platforms for big data analysis, cloud computing and virtual laboratories is becoming a key factor in expanding opportunities for independent and collaborative research activities [5]. However, the existing literature reveals several contradictions. On the one hand, international studies emphasize the potential of AI to personalize learning, automate academic support, and expand students' access to research tools. On the other hand, many authors point to unresolved problems related to academic integrity, overreliance on AI-generated results, insufficient methodological training, and unequal access to digital infrastructure. Thus, while AI is often presented as a factor that enhances research productivity, its pedagogical effectiveness depends not only on technological availability but also on the quality of instructional design, teacher readiness, and students' ability to critically evaluate AI-generated outputs.

A comparison of international studies shows that AI integration in higher education is most effective when it is embedded into research-oriented learning models rather than used as an isolated digital tool. For example, AI-supported literature search, data analysis, and visualization can strengthen students' research competencies only when combined with project-based learning, mentoring, formative feedback, and ethical guidance. This indicates a scientific gap: there is still limited empirical evidence on how students in

vocational and technical higher education institutions perceive and use AI tools in real research preparation. The present study addresses this gap using the case of Chongqing City Vocational and Technical Institute.

The need to introduce AI into the educational process of universities can be justified by a number of key arguments:

First, the 21st century is characterized by the rapid spread of AI technologies in many areas, including education. The global use of AI-based tools confirms their growing importance for the formation of research skills [6].

Second, higher education plays a key role in training highly qualified specialists for the labor market, where research competence and innovative thinking are valued. The effectiveness of this training is directly related to the successful integration of AI into educational and scientific environments [7].

Third, the use of AI facilitates the organization, administration, and monitoring of research training. It creates favorable conditions for students to acquire methodological knowledge, and also allows teachers and supervisors to develop research assignments, evaluate progress, and provide intelligent feedback [8].

Research hypothesis. The study is based on the hypothesis that the systematic use of artificial intelligence tools in students' research training positively influences the development of their research competencies, including skills in literature search, data processing, statistical analysis, visualization, and academic writing. At the same time, the effectiveness of AI integration depends on students' digital literacy, methodological support from teachers, and the presence of an ethical framework for using AI in research activities.

Purpose of the article. The purpose of this article is to analyze modern approaches to preparing students for research activities using artificial intelligence technologies, based on international experience and the case of Chongqing City Vocational and Technical Institute (China).

Research objectives:

- to examine international practices of using artificial intelligence in students' research training;
- to identify students' readiness and experience in using AI tools for research activities;
- to determine the main areas of AI application in student research, including literature search, data processing, statistical analysis, and visualization;
- to reveal the key difficulties and risks associated with AI use in research activities;
- to develop practical recommendations for improving AI-supported research training in higher education.

Materials and methods. To achieve the stated purpose and objectives, a quantitative research design was applied. The study was conducted using a quantitative method based on a questionnaire survey conducted through the online platform Wenjuanxing. The questionnaire included 19 questions divided into four semantic blocks:

1. General information about the respondents (demographic and academic profile);
2. The experience of participating in the research work of students (R&D);
3. Using artificial intelligence (AI) tools in research and development;
4. Prospects and risks of using AI in student research.

The choice of descriptive statistics was determined by the exploratory nature of the study and the need to identify the general distribution of students' responses regarding their experience, motivation, difficulties, and use of AI tools in research activities. Percentage distribution was used to describe the frequency of responses for each questionnaire item, while mean values were applied to assess students' general perception of the effectiveness of AI tools.

The data processing procedure included several stages. First, all responses collected through the Wenjuanxing platform were exported into a spreadsheet format. Second, incomplete and duplicated responses were checked and excluded from the final dataset. Third, questionnaire items were grouped according to four thematic blocks: demographic profile, research experience, AI use in research, and perceived prospects and risks. Fourth, descriptive statistical analysis was conducted to determine the percentage distribution of answers. Finally, the obtained results were interpreted in relation to the research hypothesis and compared with international findings on AI-supported research training.

The survey was conducted in December 2024 at the Chongqing City Vocational and Technical Institute (China). The study involved students of five courses studying in 16 specialties.

To ensure the representativeness of the sample, a stratified sample was used, taking into account the course and direction of training. The data obtained were processed using descriptive statistics, including percentage distribution and average values, to identify the main trends related to students' research activity and the use of artificial intelligence technologies [10].

Results and Discussion. As part of the study "Using artificial Intelligence tools to improve the quality of student research activities", a large-scale survey was conducted among students of Chongqing City Vocational and Technical Institute (China).

The total number of valid responses was 524, including representatives of various specialties – artificial intelligence, data science, Internet of Things, computer engineering, etc.

62.98% of the students surveyed were men and 37.02% were women.

Most of the participants were in their third year (68.13%), which indicates that they had the basic academic and research experience necessary to assess the impact of AI tools on scientific activities. The

largest share of respondents is represented by the areas of intellectual science and technology, data science and artificial intelligence.

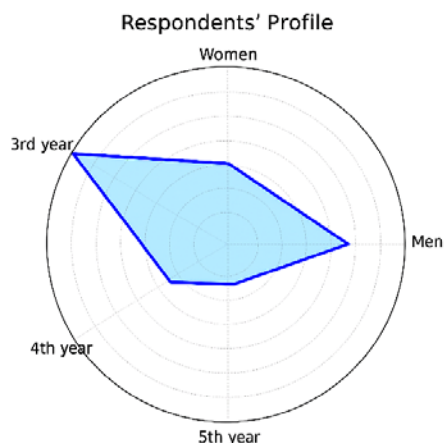


Figure 1 – Demographic profile of the respondents

More than half of the respondents (51.91%) stated their participation in student research projects. Among them, 46.18% work under the guidance of teachers, 25.95% work as part of student scientific circles, and 18.7% are engaged in independent research. This highlights that mentoring remains a key factor in student research activity at the college level.

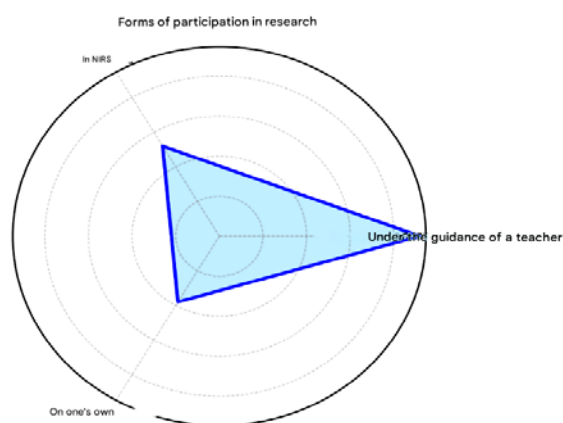


Figure 2 – Forms of participation in scientific work

The overall level of satisfaction with participation in scientific activities turned out to be moderate: 44.08% rated it at level 3 (neutral), 22.9% – at level 5 (very satisfied), 20.8% – at level 4 (satisfied). Only 12.21% expressed dissatisfaction.

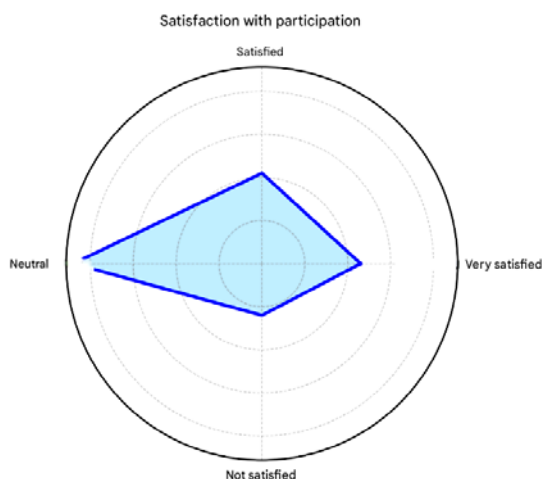


Figure 3 – The level of satisfaction with participation in research and development

The main motives for students' participation in research and development were: deepening professional knowledge (79.96%), developing research skills (77.67%) and teamwork (71.18%). A smaller proportion of respondents indicated the possibility of publications (43.13%) and participation in conferences (35.88%) as for meaningful incentives.



Figure 4 – Motivational factors of participation in scientific work

The students cited lack of research experience (83.97%), difficulties in finding information (56.87%) and lack of time (55.15%) as the main difficulties.

Almost half (49.43%) also noted the lack of a material and technical base.

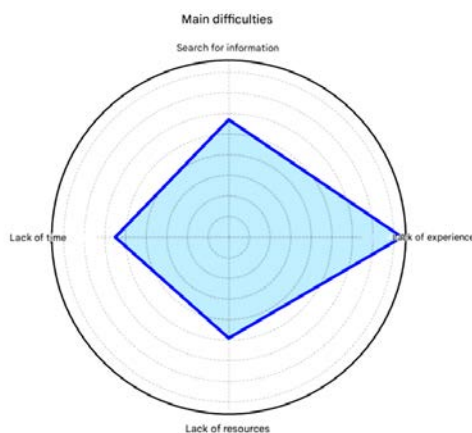


Figure 5 – The main difficulties in carrying out research and development

The vast majority of respondents (92.75%) reported that they use artificial intelligence tools in their research.

The most frequently mentioned:

- search engines with AI (77.67%, e.g. Semantic Scholar, OpenAI Tools),
- data analysis software (72.14%, e.g. Python with machine learning libraries),
- text-based AI tools (60.31%),
- Modeling and simulation programs (29.39%).



Figure 6 – Used AI tools in scientific activities

Students use AI mainly for:

- data processing and analysis (75.76%),
- literature search and analysis (74.81%),
- statistical analysis (55.15%),
- data visualization (38.55%),
- hypothesis generation and writing of scientific texts (about 34%).

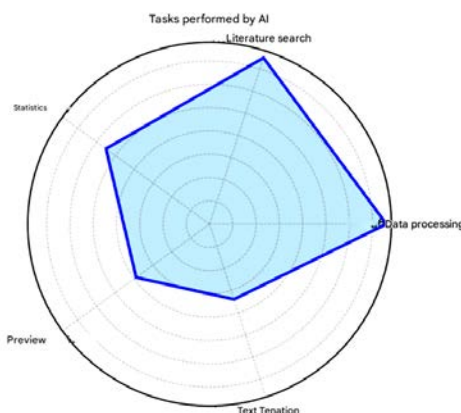


Figure 7 – Tasks performed using AI

In terms of effectiveness, the majority of respondents rated the impact of AI positively: 25% gave the highest score (5), 29.96% – 4 points. Thus, almost 55% of the participants consider the use of AI in research and development to be effective, which indicates a positive perception of the integration of artificial intelligence technologies into the scientific activities of students.

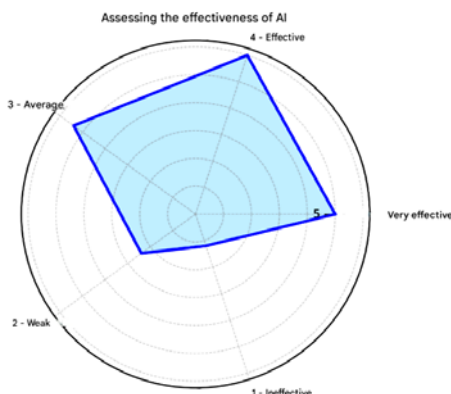


Figure 8 – Perception of the effectiveness of AI tools in student research

Almost all participants (90.46%) are confident that the use of AI in students' scientific activities will grow in the future. Students consider the key competencies necessary for successful research activities to be:

- data analysis (79.39%),
- programming (78.44%),
- working with big data (72.9%),
- understanding the principles of AI (54.77%).

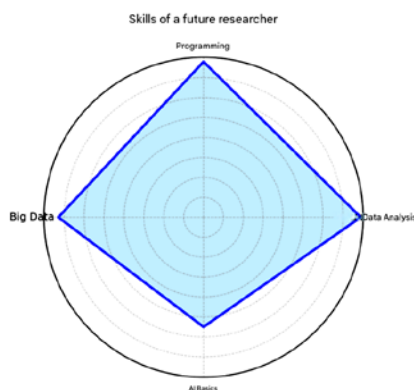


Figure 9 – AI-related skills needed for future research

At the same time, the potential risks of using AI in research and development were also identified:

- Dependence on technology (83.02%),
- Incorrect interpretation of results (71.18%),
- Risk of plagiarism (53.63%),
- Ethical issues (25.95%).

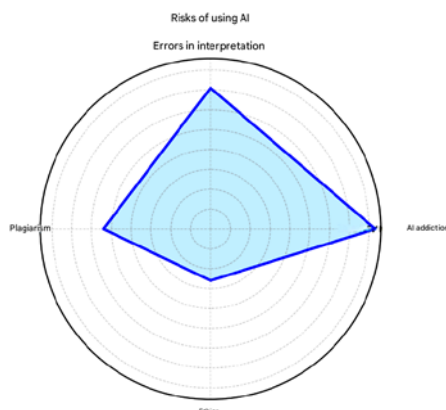


Figure 10 – Potential risks of using AI in student research

The obtained results are consistent with international studies indicating that AI tools are increasingly used by students for literature search, data processing, statistical analysis, and visualization. Similar findings have been reported in studies on AI-supported higher education, where intelligent systems were shown to facilitate academic support, improve access to information, and strengthen independent learning. However, the present study also confirms that the use of AI does not automatically lead to the development of research competence. Students still report a lack of research experience, difficulties in interpreting information, and dependence on technological tools.

Compared with international practice, the case of Chongqing City Vocational and Technical Institute demonstrates that AI is most effective when it is integrated into guided research activities rather than used independently. The high percentage of students using AI tools indicates technological readiness, but the reported difficulties show the need for structured pedagogical support. Therefore, AI integration should be accompanied by research mentoring, training in data analysis, academic integrity instruction, and critical evaluation of AI-generated content.

To ensure the transparency and reliability of the study, below is a fragment of the original questionnaire in Chinese, illustrating the structure and type of questions used.

人工智能工具在提升学生科研质量方面的实际效果调研

Уважаемые студенты!
Просим вас пройти небольшой опрос.
Все ответы собираются в анонимном формате.

1.您的性别是: [单选题] 您的性别:

选项	小计	比例
A. 男	330	62.98%
B. 女	194	37.02%
Эффективное заполнение	524	

2.您目前所处的年级: [单选题] 您的年级:

选项	小计	比例
A. 1 年级	118	22.52%
B. 2 年级	43	8.21%
C. 3 年级	357	68.13%
D. 4 年级	1	0.19%
E. 5 年级	5	0.95%
Эффективное заполнение	524	

3.您的专业: (请写出您的专业) [填空题]

专业名称	数量	专业名称	数量
材料科学专业	31	材料科学专业	28
材料科学专业	104	材料科学专业	19

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专业名称	数量	专业名称	数量
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Figure 11 – Example of the questionnaire questions

In addition, to improve their skills and ensure proper research, the researcher has completed a specialized training program and received a Certificate of Participation in the Specialized Training Program. This confirms the high level of training and professionalism in data collection and processing.



Figure 12 – Certificate of completion of training at Chongqing City Vocational and Technical Institute (China)

Overall, the findings show that AI tools are actively used by students in research-related tasks, particularly in literature analysis, data processing, and statistical work. However, the results also indicate that technological access alone is insufficient. Effective AI integration requires structured pedagogical support, research mentoring, development of digital competencies, and ethical guidance to prevent overreliance on AI and ensure responsible academic practice.

Conclusion. In conclusion, it should be noted that modern educational policy and global trends are characterized by the active introduction of artificial intelligence (AI) technologies into the educational process and research activities of students. AI is becoming not just an automation tool, but a strategic factor in improving the quality of human capital and developing the research potential of future specialists.

Based on the results, several practical recommendations can be proposed. First, universities should introduce short modular courses on the use of AI in research, including literature search, data analysis, visualization, academic writing, and plagiarism prevention. Second, AI tools should be integrated into project-based learning, where students solve real research problems under teacher supervision. Third, teachers should use a blended mentoring model that combines traditional academic supervision with AI-supported feedback on research design, data interpretation, and text structure. Fourth, institutions should develop ethical guidelines regulating the acceptable use of AI in student research, including requirements for transparency, citation, verification of AI-generated content, and academic responsibility. Fifth, special attention should be paid to teacher training, as instructors need methodological, digital, and ethical competencies to guide students in the responsible use of AI.

World practice shows that the success of AI in the educational field directly depends on its inclusion in the holistic concept of the development of the national education system, covering organizational, substantive and methodological aspects of student training. In this context, the experience of Chongqing City Vocational and Technical Institute demonstrates the effectiveness of a model in which AI is used to analyze data, visualize results, search for information, generate hypotheses, and automate research processes.

Of particular importance is the role of the teacher, who acts not only as a mentor, but also as a mediator between the student and intellectual technologies. Effective teacher training for the use of AI requires mastery of the methodology of digital tools, knowledge of the principles of algorithms and the ethics of their application. In a number of countries, teacher training is conducted with the participation of AI system developers, which ensures high practical effectiveness.

In general, the introduction of artificial intelligence technologies contributes to the transition of education to a new level – to a model of adaptive, research-oriented and sustainable learning. Government and institutional reforms in this area create conditions for improving the quality of student education, developing digital culture and student satisfaction.

The authors believe that the results of this study can be useful for teachers and researchers seeking to integrate AI into the process of preparing students for research, as well as serve as an incentive for further improvement of educational practices in universities in Kazakhstan and other countries.

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